We claim:

1. An apparatus for remotely sensing the amount of pollutants in the exhaust plume of a vehicle, comprising:

an ultraviolet light source for propagating ultraviolet light through the exhaust plume;

an output lens for collimating the ultraviolet light from the ultraviolet light source before it propagates through the exhaust plume; and

an ultraviolet light spectrometer for receiving said ultraviolet light after it has passed through the exhaust plume of a vehicle and producing a hydrocarbon signal representative of the amount of absorption of the ultraviolet light by selected hydrocarbons in the vehicle exhaust plume.

2. The apparatus of claim 1, further comprising an input lens for receiving the ultraviolet light that has passed through the exhaust plume and focusing the light on said spectrometer.

3. The apparatus of claim 1, wherein said spectrometer also produces a nitric oxide signal representative of the amount of absorption of the ultraviolet light by nitric oxide.

4. The apparatus of claim 3, further comprising an infrared light source for propagating near-infrared light through the exhaust plume, and an infrared detector for receiving said near-infrared light after it has passed through the exhaust plume of a vehicle and producing a near-infrared signal representative of the amount of absorption of near-infrared light by the exhaust plume.

5. The apparatus of claim 4, wherein said infrared light source can produce a wavelength corresponding to an absorption line of carbon dioxide, said near-infrared signal represents the amount of absorption of the near-infrared light by carbon dioxide in the vehicle exhaust plume, and said apparatus further comprises a processor, responsive to said ultraviolet and near-infrared signals, for providing an indication of the amount of said selected hydrocarbons and selected nitric oxide relative to the amount of carbon dioxide in the exhaust plume.

6. The apparatus of claim 4, wherein said infrared light source is tunable across a band of near-infrared wavelengths so as to produce a near-infrared signal representative of the amount of absorption of near-infrared light by carbon dioxide and carbon monoxide in the exhaust plume.

7. The apparatus of claim 6, wherein said processor further determines the amount of carbon monoxide relative to the amount of carbon dioxide in the exhaust plume.

8. The apparatus of claim 1, further comprising an infrared light source for propagating near-infrared light through the exhaust plume, and an infrared detector for receiving said near-infrared light after it has passed through the exhaust plume of a vehicle and producing a near-infrared signal representative of the amount of absorption of near-infrared light by the exhaust plume.

9. The apparatus of claim 8, wherein said infrared light source can produce a wavelength corresponding to an absorption line by carbon dioxide, said near-infrared signal represents the amount of absorption of the near-infrared light by carbon dioxide in the vehicle exhaust plume, and said apparatus further comprises a processor, responsive to said ultraviolet and near-infrared signals, for providing an indication of the amount of said selected hydrocarbons relative to the amount of carbon dioxide in the exhaust plume.

10. The apparatus of claim 9, wherein said infrared light source is tunable across a band of near-infrared wavelengths so as to produce a near-infrared signal representative of the amount of absorption of near-infrared light by carbon dioxide and carbon monoxide in the exhaust plume, said processor being adapted also to determine the amount of carbon monoxide relative to the amount of carbon dioxide in the exhaust plume.

11. The apparatus of claim 1, further comprising a tunable infrared light source for propagating near-infrared light through the exhaust plume, and an infrared detector for receiving said near-infrared light after it has passed through the exhaust plume of a vehicle and producing a

near-infrared signal representative of the amount of absorption of near-infrared light by the exhaust plume.

12. The apparatus of claim 11, further comprising a processor for determining from said ultraviolet signal and said near-infrared signal the relative amounts of said selected hydrocarbons and other materials having ultraviolet and near-infrared absorption lines.

13. The apparatus of claim 11, wherein said tunable infrared light source is a laser.

14. An apparatus for remotely sensing the amount of pollutants in a plume of vehicle exhaust, comprising:

an ultraviolet light source for propagating ultraviolet light through the exhaust plume;

a tunable infrared light source for propagating near-infrared light through the exhaust plume;

an ultraviolet light spectrometer for receiving said ultraviolet light after it has passed through the exhaust plume of a vehicle and producing a hydrocarbon signal representative of the amount of absorption of the ultraviolet light by selected hydrocarbons in the vehicle exhaust plume and a nitric oxide signal representative of the amount of absorption of the ultraviolet light by nitric oxide;

an infrared detector for receiving said near-infrared light after it has passed through the exhaust plume of a vehicle and producing a near-infrared signal representative of the amount of absorption of near-infrared light by the exhaust plume; and

a processor, responsive to said ultraviolet signal and said near-infrared signal, for determining the relative amounts of said selected hydrocarbons, selected nitric oxide, and carbon dioxide in the exhaust plume.

15. The apparatus of claim 14, wherein said processor further determines the relative amount of carbon monoxide in the exhaust plume.

16. The apparatus of claim 14, further comprising an output beam splitter disposed so as to receive ultraviolet light from said ultraviolet light source and near-infrared light from said infrared light source so as to combine ultraviolet and near-infrared light therefrom along a single optical output axis, and an output lens disposed on said output axis for collimating the ultraviolet and near-infrared light with respect to said output axis for propagation through the exhaust plume.

17. The apparatus of claim 16 further comprising, an infrared detector, an input lens, and an input beam splitter, said input beam splitter being disposed so as to receive light from said input lens and split said light into an ultraviolet component directed to said ultraviolet spectrometer and a near-infrared component directed to said infrared detector.

18. The apparatus of claim 17, further comprising a retroreflector for receiving light emitted by said apparatus and passed through the exhaust plume, and reflecting said light to said input lens.

19. The apparatus of claim 14, wherein said tunable infrared light source is a laser.

20. A method of remotely sensing the amount of pollutants in the exhaust plume of a vehicle comprising:

propagating a collimated ultraviolet light beam through the exhaust plume; and

determining the intensity of predetermined wavelengths of ultraviolet light corresponding to absorption lines of selected hydrocarbons after said ultraviolet light beam has passed through the exhaust plume, said intensity of said predetermined wavelengths of ultraviolet light corresponding to the amounts of respective selected hydrocarbons in the exhaust plume.

21. The method of claim 20, further comprising determining the intensity of a predetermined wavelength of said ultraviolet light corresponding to an absorption line of nitric oxide after said

ultraviolet light has passed through the exhaust plume, said intensity of said wavelength of ultraviolet light corresponding to the amount of nitric oxide in the exhaust plume.

22. The method of claim 20, further comprising propagating a collimated near-infrared light beam through the exhaust plume, and determining the intensity of a predetermined wavelength of said near-infrared light corresponding to an absorption line of carbon dioxide after said near-infrared light has passed through the exhaust plume, said intensity of said predetermined wavelengths of near-infrared light corresponding to the amount of carbon dioxide in the exhaust plume.

23. The method of claim 22, further comprising determining the intensity of a predetermined wavelength of said ultraviolet light corresponding to an absorption line of nitric oxide after said ultraviolet light has passed through the exhaust plume, said intensity of said wavelength of ultraviolet light corresponding to the amount of nitric oxide in the exhaust plume.

24. The method of claim 23, further comprising tuning said near-infrared light beam separately to said absorption line of carbon dioxide and to an absorption line of carbon monoxide, and determining the amounts of said selected hydrocarbons, nitric oxide and carbon monoxide relative to carbon dioxide in the exhaust plume